

# Wage Spillover and Unemployment in a Wage-Gap Economy: The Jamaican Case\*

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## I. Introduction

There are two distinct employment problems in most less developed countries. The first, and more familiar, problem is how to accelerate the rate of growth of employment in the high-wage, modern sector. The second problem, which is frequently perceived incorrectly to be the mere converse of the first, is how to reduce the stock of unemployment. This distinction is not new. Fifteen years ago Arthur Lewis remarked that "if we wish to measure our achievements in development, we must measure them not by the fall of unemployment, but by the increase of employment."<sup>1</sup>

This paper analyzes the determinants of the level of unemployment and the relationship between employment growth and unemployment, with particular reference to Jamaica. In briefest outline, the argument is that, whereas the rate of modern-sector employment growth is largely a function of wage trends,<sup>2</sup> the level of unemployment is a function of the wage

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<sup>1</sup> W. Arthur Lewis, "Employment Policy in an Underdeveloped Area," *Social and Economic Studies* 7 (September 1958): 45.

<sup>2</sup> Some of the more recent empirical work supporting this proposition can be found in: Henry J. Bruton, *The Elasticity of Substitution in Developing Countries*, Research Memorandum 45 (Williamstown, Mass.: Center for Development Economics, Williams College, April 1972); Mark R. Daniels, "Differences in Efficiency among Industries in Developing Countries," *American Economic Review* 59 (March 1969): 159-71; John R. Harris and Michael P. Todaro, "Wages, Industrial Employment, and Labour Productivity: The Kenyan Experience," *East African Economic Review* 1 (June 1969): 29-46; John Isbister, "Urban Employment and Wages in a Developing Economy: The Case of Mexico," *Economic Development and Cultural Change* 20 (October 1971): 24-46; Gene M. Tidrick, *Wages, Output, and the Employment Lag in Jamaica*, Research Memorandum 40 (Williamstown, Mass.: Center for Development Economics, Williams College, December 1970); and Jeffrey G. Williamson, "Capital Accumulation, Labor Saving, and Labor Absorption Once More," *Quarterly Journal of Economics* 85 (February 1971): 40-65. The importance of wage trends is disputed in Werner Baer and Michel E. A. Herve, "Employment and In-

structure.<sup>3</sup> The two problems are linked because wage increases in the modern, high-wage sector alter the wage structure and because employment increases in the high-wage sector make unemployment more attractive for some workers. The model developed to analyze employment and wage changes in a wage-gap economy is shown to be quite useful in explaining the actual changes that have occurred in the Jamaican economy since 1950. Although the most systematic evidence supporting the model comes from Jamaica, the analysis should be applicable to other wage-gap economies as well.

## II. Jamaican Wage and Employment Patterns

A casual survey of urban unemployment levels in the Caribbean raises an intriguing question: Why does poor and stagnant Haiti seemingly have less open urban unemployment than comparatively rich and rapidly growing Jamaica, Puerto Rico, and Trinidad? There are no unemployment statistics for Haiti, but to all appearances open unemployment is lower than in the more prosperous islands. In Puerto Rico and Jamaica, unemployment has probably not fallen below 10 percent of the labor force since at least 1950, and Trinidad has more recently achieved this dubious distinction.<sup>4</sup> Why should the poorest of these structurally similar economies have the least unemployment problem?

dustrialization in Developing Countries," *Quarterly Journal of Economics* 80 (February 1966): 88-107; and in J. B. Knight, "Earnings, Employment, Education, and Income Distribution in Uganda," *Bulletin of the Oxford Institute of Economics and Statistics* 30 (November 1968): 267-97.

<sup>3</sup> This hypothesis was initially formulated in Gene M. Tidrick, "Wage Structure and Unemployment in Underdeveloped Areas," unpublished (Cambridge, Mass.: Harvard University, December 16, 1968), in an effort to incorporate some observations of Arthur Lewis into a formal and systematic model. Some of the relevant writings by Lewis are: *Development Planning* (London: George Allen & Unwin, 1966), pp. 76-87; "Jamaica's Economic Problems," *Daily Gleaner* (Kingston), September 1964; and "Employment Policy in an Underdeveloped Area" (n. 1 above). Many of the same ideas were developed separately at about the same time by Michael P. Todaro, "A Model of Labor Migration and Urban Unemployment in Less Developed Countries," *American Economic Review* 59 (March 1969): 138-48; and John R. Harris and M. P. Todaro, "Migration, Unemployment, and Development: A Two-Sector Analysis," *American Economic Review* 60 (March 1970): 126-42, among other writings. The Todaro analysis has inevitably influenced and helped to clarify the model presented here. The link between expected lifetime earnings differentials and unemployment is central to both models, but my model gives greater emphasis to wage spillover and the sharing mechanism. The present paper also analyzes the effect of external migration on unemployment and relates the predictions of the model to wage, employment, and migration patterns in Jamaica and other countries.

<sup>4</sup> On Puerto Rico, see Lloyd G. Reynolds and Peter Gregory, *Wages, Productivity, and Industrialization in Puerto Rico* (Homewood, Ill.: Richard D. Irwin, Inc., 1965); and for Trinidad, see Jack Harewood, *Employment in Trinidad and Tobago 1960* (Mona, Jamaica: Institute of Social and Economic Research, University of the West Indies, n.d.). For more recent figures, see David Turnham, *The Employment Problem in Less Developed Countries* (Paris: Development Centre of the OECD, 1971), p. 46. Employment data for Jamaica in this paper and some wage data are from Jamaica, Department [formerly Central Bureau] of Statistics, *Census of Jamaica and Its Dependencies, 1943: The Census of Jamaica, 1960*.

This is not the only perplexing question about Jamaican unemployment. Between 1953 and 1960 total output in real terms increased 76.8 percent while the labor force increased by only 2.5 percent (15,800 workers) due to massive emigration to the United Kingdom. "Modern" nonagricultural jobs<sup>5</sup> increased by an estimated 50,000 during this same period. Yet unemployment fell only slightly from 98,000 to 88,100. Why did this spectacular output growth in the face of an almost stable labor force fail to cut unemployment more? Why did the relatively large increase in modern sector jobs not create more net employment in the economy as a whole? Why did migration not reduce unemployment, especially since so many of the migrants were unemployed?

Finally, what can we make of Jamaican wage behavior? Real average earnings (money earnings deflated by the cost-of-living index) rose by 2.6 percent per year between 1942 and 1960. In recent years the rate of increase has been more like 4 percent. The Jamaican economy is heavily unionized and output growth has been high, but these trends are still noteworthy for two reasons. First, the rate of open unemployment (where the definition of unemployment embraces all workers wanting work but working less than 1 day in a survey week) has remained extremely high since the 1930s. The lowest rate ever recorded was 13 percent in 1960. More importantly, wages in unorganized sectors of the economy rose by about the same amount as in unionized sectors. For example, real average earnings of female personal service workers (mostly domestic servants) rose 46.6 percent between 1942 and 1960 compared with an increase of 60 percent for all workers. Scattered evidence from the unorganized parts of agriculture suggests a similar pattern. Why were real wages not bid down in unorganized sectors? Moreover, despite rising rural wages and high overall unemployment, genuine labor shortages in rural areas have existed since the mid 1950s. How can we account for these shortages in the midst of high unemployment?

None of these puzzling features of Jamaican wage and employment

*Survey of the Population of Jamaica, Oct./Nov. 1953.* Other wage or average earnings data are from Jamaica, Department of Statistics, *Employment and Earnings in Large Establishments and Wage Rates, 1957-1965*. Output figures are from Jamaica, Department of Statistics, *National Accounts: Income and Expenditure, 1950-1961*, and *National Income and Product, 1965-*; and from Alfred P. Thorne, "Size, Structure, and Growth of the Economy of Jamaica," *Social and Economic Studies* 4, suppl. (December 1955): 1-156. For a detailed discussion of Jamaican wage, employment, and output data, and of the adjustments made to achieve comparability of data from different sources, see Gene M. Tidrick, "Wages and Unemployment in Jamaica" (Ph.D. diss., Harvard University, 1972), esp. chap. 3.

<sup>5</sup> For statistical purposes, the modern sector is defined to include all mining workers, factory workers in manufacturing, all other workers in secondary industries except own-account workers and employers in construction and distribution, and service workers excluding domestic service. Between 1942 and 1960, modern jobs thus defined increased by 94,000 to 194,700, or about one-third of the labor force in 1960. Figures for the subperiod 1953-60 are not available but output trends suggest

patterns can be fully understood without reference to the distorted wage structure, that is, a wage structure in which workers of the same skill level receive different wages in different industries. The Jamaican wage structure is clearly distorted by this definition. Disparities among major sectors are dramatic. Unskilled bauxite mining workers earn about twice as much per week as unskilled workers in transportation or construction, the two next most highly paid industries. (In fact, unskilled mining workers earn more than skilled construction workers.) Unskilled construction workers, in turn, earn almost two and one-half times as much as agricultural workers. Within manufacturing, Jamaica also has high interindustrial wage differentials by international standards. Papola and Bharadwaj have calculated the coefficient of variation of wages at the two-digit level for 17 countries, including nine less developed countries. When Jamaica is added to the list, she ranks fourth highest of the 18 countries, exceeded only by Kenya, Ghana, and Mexico.<sup>6</sup>

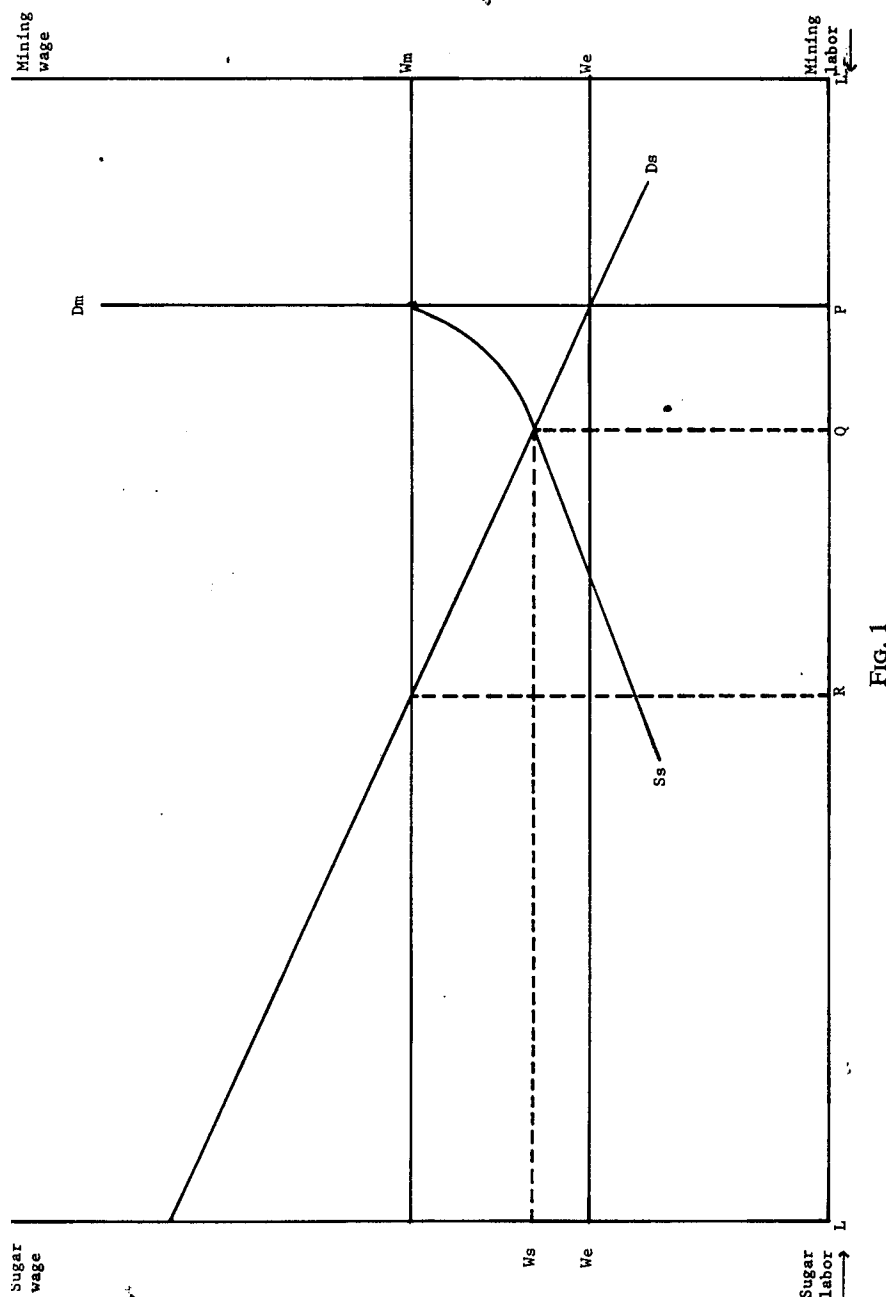
This paper argues that wage spillover into unorganized sectors and the failure of emigration or rapid modern-sector employment growth to reduce unemployment significantly are all consequences of development within a distorted wage structure. Similarly, one of the reasons Jamaica has higher open unemployment than Haiti is that an economy with a large high-wage sector can "afford" more unemployment than an economy in which this sector is small or nonexistent. The wage-gap model that follows elaborates these propositions.

### III. The Wage-Gap Model

Consider an economy in which labor is homogeneous and in fixed supply, all workers are wage earners, there are two sectors, and all production is for export at a fixed exchange rate. The last assumption permits us to ignore differences between the money wage rate and the real wage rate. We call the two sectors mining and sugar, but they could be called urban and rural, modern and traditional, or manufacturing and agriculture, depending on the economy. Assume, also, that the demand curve for labor in sugar is downward sloping but that the demand curve for labor in mining is completely inelastic. This last assumption is not necessary but simplifies the analysis and conforms to the conventional wisdom that coefficients are fixed and product demand inelastic in mining (the modern sector).

In figure 1, the demand for labor in the sugar sector ( $D_s$ ) is measured from left to right. The demand for labor in the mining sector ( $D_m$ ) is measured from right (at  $L'$ ) to left. The  $D_m$  is completely inelastic at  $L'P$ . In a competitive labor market, the allocation of the fixed supply of labor  $LL'$  between the two sectors and the equilibrium wage rate will be determined by the intersection of the two demand curves. In equilibrium,  $LP$

<sup>6</sup> See T. S. Papola and V. P. Bharadwaj, "Dynamics of Industrial Wage Structure: An Inter-Country Analysis," *Economic Journal* 80 (March 1970): 76. Jamaican data are for 17 instead of 20.



workers will be employed in sugar and  $L^P$  will be employed in mining at a wage in both sectors of  $We$ . There is full employment and the equilibrium is stable. As long as the labor market is competitive, there is no tendency for the wage level to rise above  $We$  in either sector.

Assume, however, that in mining the wage is set at  $W_m$ , perhaps at the initiative of employers seeking better public relations or of government or unions who see an opportunity to raise mining wages without curtailing mining employment. Under certain assumptions, the effect of setting the mining wage at  $W_m$  will be to create an incentive for some workers to withdraw from sugar employment to seek a job in the high-wage mining sector. The number who choose to withdraw from the sugar sector is a function of the wage gap between the two sectors. Thus, if the mining-sector wage is  $W_m$  and the sugar-sector wage is  $W_s$ ,  $QP$  workers would choose to withdraw from sugar employment to seek mining employment. If the sugar wage were lower, more workers would withdraw, and if it were higher, fewer workers would withdraw. Only if the sugar-sector wage were also  $W_m$  would no workers withdraw from sugar employment. We can plot the succession of such points to obtain the supply curve of labor to the sugar sector, given a mining wage equal to  $W_m$ . The curve is labeled  $S_s$  in figure 1. If the sugar-sector labor market remains competitive and the mining wage remains fixed at  $W_m$ , the new "equilibrium" sugar wage will be  $W_s$ . Then  $LQ$  workers will be employed in sugar,  $L'P$  will be employed in mining, and  $QP$  workers will be unemployed. If the mining wage were raised above  $W_m$ , the supply curve of labor to sugar would shift upward, thereby raising the equilibrium sugar wage above  $W_s$  and creating unemployment greater than  $QP$ .

To see this, assume that the fixed supply of labor is the result of a balanced flow of new entrants into the labor force and of retirements. At any given time, therefore, there will be new job openings in mining. Assume, further, that the probability of getting a mining job is higher if a worker is not employed in sugar, perhaps because hiring is done at the gate and sugar and mining activities are located in different parts of the country. It will then be rational for a new entrant to remain unemployed rather than take a job in sugar, or for a sugar worker to quit his job in order to seek a job in mining so long as: (1) the present value of his forgone earnings in sugar is less than the expected lifetime earnings in mining and (2) he has some means of subsistence during his period of unemployment. Expected lifetime earnings in mining are simply the probability of having a mining job in each period times the mining wage summed over the worker's remaining work life, or

$$PV_m = \sum_{t=0}^n \frac{P(t)W_m}{(1+r)^t}, \quad (1)$$

$P(t)$  is the ratio of the number of hirings mining in period  $t$ ,  $H(t)$ , to the number of unemployed workers,  $U(t)$ . That is,

$$P(t) = H(t)/U(t). \quad (2)$$

The present value of lifetime earnings in sugar,  $PVs$ , is

$$PVs = \sum_{t=0}^n \frac{Ws}{(1+r)^t} \quad (3)$$

and the equilibrium labor market condition is

$$PVs = PVm. \quad (4)$$

I defer the question of how the unemployed survive until a later section.

When the mining wage is raised, workers will leave sugar employment (or new entrants will remain unemployed) until the probability of getting a mining job is lowered sufficiently (unemployment raised sufficiently) to reestablish equality between  $PVs$  and  $PVm$ . In terms of figure 1, a rise in the mining wage to  $Wm$  will shift the supply curve of labor to sugar to  $Ss$ , cause the sugar wage to rise to  $Ws$ , and create unemployment of  $PQ$ . This supply-withdrawal unemployment is overt by any conventional measure. Workers could truthfully answer a labor force questionnaire that they wanted but could not obtain more work in either sector at the going wage. They could get a job in sugar at a lower wage rate, but their reserve supply price has risen and they would not accept it. They would take a lower wage in mining and bid that wage down but are prevented from doing so by market imperfections. They are voluntarily unemployed with respect to sugar but involuntarily unemployed with respect to mining.

Even if an increased mining wage does not reduce employment directly in the mining sector itself, it will reduce employment (and output) indirectly in sugar. Moreover, the mining wage increase spills over into the sugar sector, raising the sugar wage. This effect does not depend on unionization. Wages rise in sugar even though sugar workers remain completely unorganized.

The spillover into higher sugar wages and unemployment can be shown more clearly from the equilibrium labor market condition in equation (4). For simplicity, we use a one-period version and rewrite the equilibrium condition:

$$Ws = \frac{H}{U} Wm. \quad (5)$$

With a constant labor stock ( $L$ ) and constant mining employment ( $M$ ), there will be a constant rate of turnover or flow through in each period so that the number of hirings ( $H$ ) is also constant. With  $H$  constant, an increase in  $Wm$  must cause either  $Ws$  or  $U$  or both to rise in order to reestablish equilibrium.

getting a high-wage job and hence the expected lifetime earnings of workers seeking mining employment. In figure 1, if the  $Dm$  curve shifts outward (to the left) at a constant wage  $Wm$ , the supply curve of labor to sugar will also shift farther upward as the increased probability of securing mining employment induces more workers to leave sugar employment. Thus, if mining employment increased to  $L'Q$  in figure 1, unemployment would not be eliminated because the shift in the  $Dm$  curve would induce a shift in the supply curve of labor to sugar above  $Ss$ . Whether total unemployment would be less or greater than the original  $PQ$  after an increase in mining employment of  $QP$  depends on many factors, but it is clear that the net employment increase in the economy as a whole is less than the gross employment increase in mining in a wage-gap economy. Continued employment growth in mining at a constant wage  $Wm$  would not completely eliminate unemployment until mining employment was  $L'R$ .<sup>7</sup> Outward shifts in the  $Ds$  curve would decrease unemployment by the amount that sugar employment increased, however. Net and gross employment effects are equal.

Once again, reference to equation (5) may clarify the argument. An increase in mining employment raises the rate of hiring and also reduces unemployment initially. To restore equilibrium, either  $Ws$  or  $U$  or both must rise.

#### IV. Extensions of the Model

I have shown that rising mining wages spill over into the sugar sector and that mining employment growth will not reduce unemployment by a like amount in a wage-gap economy. Both of these results are consistent with the Jamaican wage and employment patterns summarized previously.

We can now specify the wage spillover and net employment effects more precisely and incorporate the effects of labor force growth. Discussion of how the unemployed survive is again deferred. It is assumed that the single-period model is a fair approximation of the multiperiod model.<sup>8</sup>

Let primes denote percentage change. Neglecting interactions, we can see from equation (5) that to restore equilibrium after a change in any variable, other variables must change so that

$$Ws' + U' = Wm' + H'. \quad (6)$$

For the percentage change in unemployment we can substitute

$$U' = \frac{L}{U} L' - \frac{S}{U} S' - \frac{M}{U} M'. \quad (7)$$

<sup>7</sup> The supply curve of labor to mining is completely elastic at wage  $Wm$  as long as the wage gap persists.

<sup>8</sup> I assume that discounting offsets the increase over time in expected earnings of

Since

$$S' = \eta_s Ws', \quad (8)$$

where  $\eta_s$  is the elasticity of demand for labor in sugar, and

$$H' = M' \quad (9)$$

after  $M'$  has stabilized at a constant rate, we can substitute and rearrange terms to obtain

$$Ws' = \frac{Wm' - (L/U)L' + M'[1 + (M/U)]}{1 - (S/U)\eta_s} \quad (10)$$

From equations (6) and (9), we also obtain

$$U' = Wm' + M' - Ws'. \quad (11)$$

These results only hold approximately, of course, because we have neglected interactions.

Several conclusions can be drawn from equations (10) and (11). First, although any increase in mining wages will increase sugar wages and unemployment, it will never narrow the wage gap. To narrow the wage gap, mining employment (or sugar employment) must also be increasing. In fact, sugar wages may even decline if the labor force is growing. Sugar wages will be pulled up only if  $Wm' > (L/U)L'$ , a condition which was met in Jamaica during the period of heavy migration but which probably is not in most developing countries.

Second, any increase in the rate of growth of the labor force will increase unemployment and widen the wage gap.

Third, an increase in the rate of growth of mining employment, other things being equal, will raise the level of unemployment as long as  $M/S < |\eta|$ .<sup>9</sup> Thus, if the wage elasticity of demand for labor in sugar is minus unity, the mining sector must be larger than the sugar sector before an increase in the rate of growth of mining employment will reduce unemployment. At the same time, of course, any increase in the rate of growth of mining employment will advance the day when the size of the mining sector does exceed the size of the sugar sector. Thus, the Lewis policy prescription—increase the rate of growth of (mining) employment and forget about the rate of unemployment—may make sense as a second-best criterion for economies which cannot eliminate wage distortion. Moreover, if we

<sup>9</sup> Let  $Wm'$  and  $L' = 0$ . From eq. (11),  $U' = 0$  when  $M' = Ws'$ . Substituting from equation (10),

$$M' = \frac{M'[1 + (M/U)]}{1 - (S/U)\eta_s},$$

and hence

$$1 + \frac{M}{U} = 1 - \frac{S}{U}\eta_s.$$

Rearranging and canceling terms, we see that  $M/S = -\eta_s$ .

acknowledge that the most likely way to increase  $M'$  is to reduce  $Wm'$ , the conflict between reducing unemployment in the short run and reducing it in the long run disappears. As long as the wage elasticity of demand in mining,  $\eta_m$ , is greater than  $1/[1 + (M/u)]$ , any acceleration of growth of mining employment induced by wage reduction will reduce unemployment in the short run as well as in the long run.

Finally, emigration will have only a small effect on unemployment in a wage-gap economy. Even if unemployed workers migrate, the migration will not reduce unemployment by a like amount, since the initial reduction in unemployment raises the probability of getting a mining job and stimulates further migration from sugar. The migration of any worker, employed or unemployed, has the same effect as any reduction in the labor force if labor is homogeneous. Suppose, to choose figures representative of Jamaica during the period of mass migration, that unemployment is 15 percent of the labor force, 60 percent of the labor force is in the low-wage sector, and the wage elasticity of demand in the low-wage sector is minus unity. From equations (10) and (11) we can calculate that if 1 percent of the labor force migrates, unemployment will be reduced by 1.33 percent. That is, five workers must migrate to reduce unemployment by one worker.<sup>10</sup> The weak employment effect of migration appears even weaker than it is, of course, since the unemployed remain in the numerator of the unemployment rate while the migrants who obtain work abroad disappear from the denominator. This analysis may explain why not only Jamaica but also Puerto Rico has had little success in reducing unemployment through migration.<sup>11</sup>

## V. The Sharing Mechanism

Unemployment is a rational response to a distorted wage structure only if the unemployed have some means of subsistence. The nature of the sharing mechanism will be an important determinant of the level of unemployment which the system can sustain.<sup>12</sup>

The simplest mechanism for sharing the benefits of high mining wages is a system of casual labor. This is analyzed in figure 2. The quantity  $Wm$

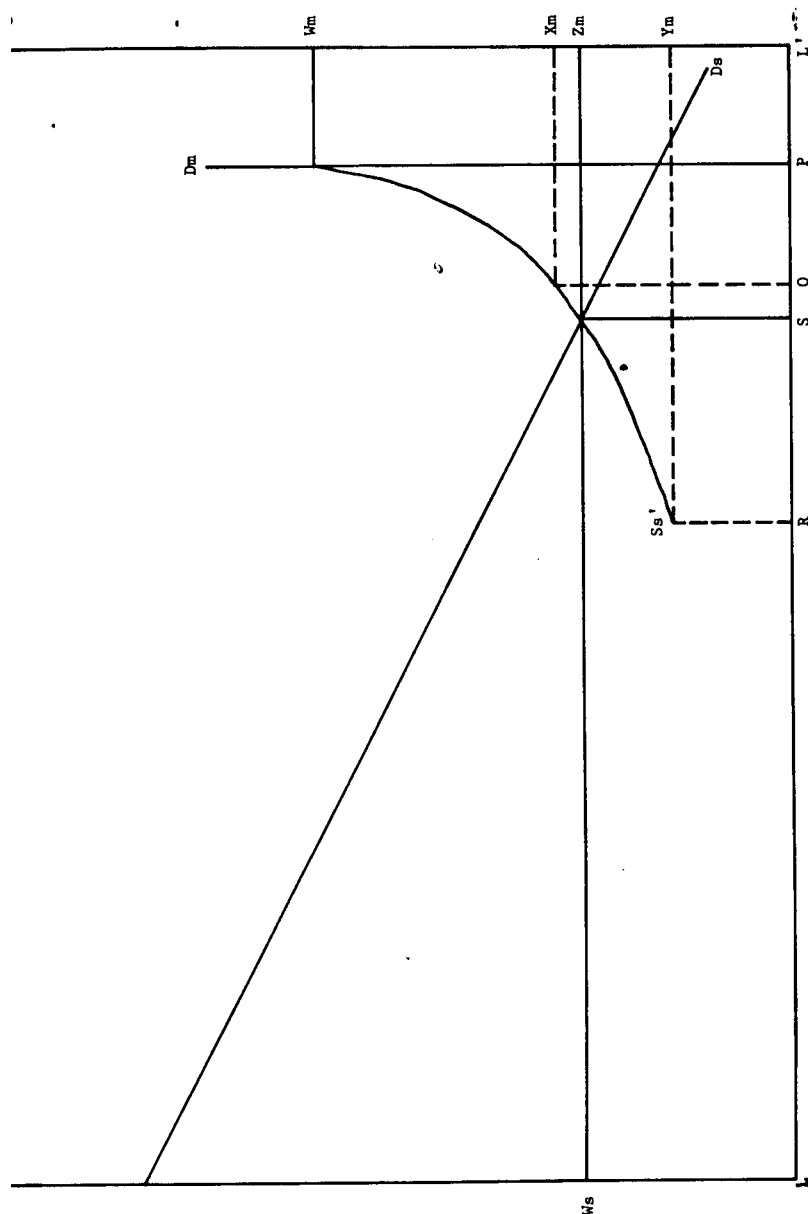
<sup>10</sup> To simplify the calculation, set  $Wm'$  and  $M'$  equal to zero. Before migration,  $L' = .01$ . Thus,

$$Ws' = \frac{0 - (100/15)(.01) - 0}{1 - (4)(-1)} = -.0133$$

and  $U' = .0133$ . After migration,  $L' = 0$ , so that  $U' = 0$ . Thus, a 1 percent decrease in the labor force reduces unemployment growth by 1.33 percent. But 1 percent of 100 equals one worker and 1.33 percent of 15 equals 0.2 workers. Thus, five workers must migrate to reduce unemployment by one.

<sup>11</sup> In an earlier paper, I argued that the migration of unskilled labor reduces unemployment by an equivalent amount. This would be true only if unemployment is caused by something other than the wage gap (see Gene M. Tidrick, "Some Aspects of Jamaican Emigration to the United Kingdom, 1953-1962," *Social and Economic Studies* 15 [March 1966]: 22-39).

<sup>12</sup> The analysis of the sharing mechanism owes much to G. E. Cumper, "Lewis' Two-Sector Model of Development and the Theory of Wages," *Social and Economic Studies* 12 (March 1963): 37-50.



is the mining wage, and it is assumed that mining could provide full-time employment for  $PL'$  workers. If mining employment is shared equally on a casual basis, mining could provide half-time employment for twice as many ( $QL'$ ) workers at half ( $Xm$ ) the earnings, or one-fourth employment for  $RL'$  workers at earnings of  $Ym$ . In equilibrium,  $SL'$  workers will work part-time in mining at average earnings  $Zm$  and  $LS$  workers will work in sugar at average earnings  $Ws (=Zm)$ . (This ignores the disutility of effort.) There will be the equivalent of  $SP$  full-time man-days of unemployment.

With a casual labor-sharing mechanism there is no uncertainty about obtaining high-wage employment: employment (and unemployment) is shared out equally to all seekers. As a result, instead of the present values of lifetime earnings, actual earnings are equalized between sugar and mining. The effect of increased mining wages or of a shift in the  $Dm$  curve is exactly the same as analyzed previously, however. The equilibrium stock of unemployment (total casual workers, in this case) rises, sugar employment and output fall, and sugar wages rise.

High-wage casual employment is a fairly important source of income for the "unemployed" in Jamaica. Counting opportunities in dock working, construction, tourism, and illegal activities, it is not hard to imagine that from a quarter to a half of unemployed males might earn at least as much or more over a year's time as a full-time wage earner in agriculture. The large number of casual jobs available also explains why unemployment is such a different phenomenon in less developed countries. A 10 percent unemployment rate is more likely to mean that 20 percent of the labor force is unemployed half the time.

Sharing mechanisms which allow the unemployed to subsist while looking for high-wage jobs are also undoubtedly important. Figure 3 illustrates one possible mechanism. Assume that  $L'P$  mining workers are hired on a full-time basis. Earnings in mining cannot be bid down as in a casual labor system, and it becomes rational for some workers to remain unemployed at a subsistence level while seeking permanent full-time employment in mining. The number who can afford to remain unemployed, and hence the number forced back into sugar, are determined by the sharing mechanism. Assume that each mining worker retains  $YuWm$  of his wage and shares  $L'Yu$  with the unemployed, either through charity, taxes, or as support for an unemployed member of his own household. If  $Yu (= 1/3 \text{ of } Wm)$  is the subsistence income of an unemployed worker, then  $PQ$  unemployed could be supported by  $L'P$  mining workers. The other  $LQ$  workers would be forced into or would choose sugar employment at a wage  $Ws$ . In practice,  $Yu$  may not be rigidly fixed at the subsistence level, and the precise allocation of nonmining workers between sugar and unemployment (and thus the level of sugar wages and of unemployed workers' incomes) would be determined more in the manner described previously. Sugar employment and wages would settle at a level which equalized the present value of lifetime earnings in sugar and unemployment cum mining

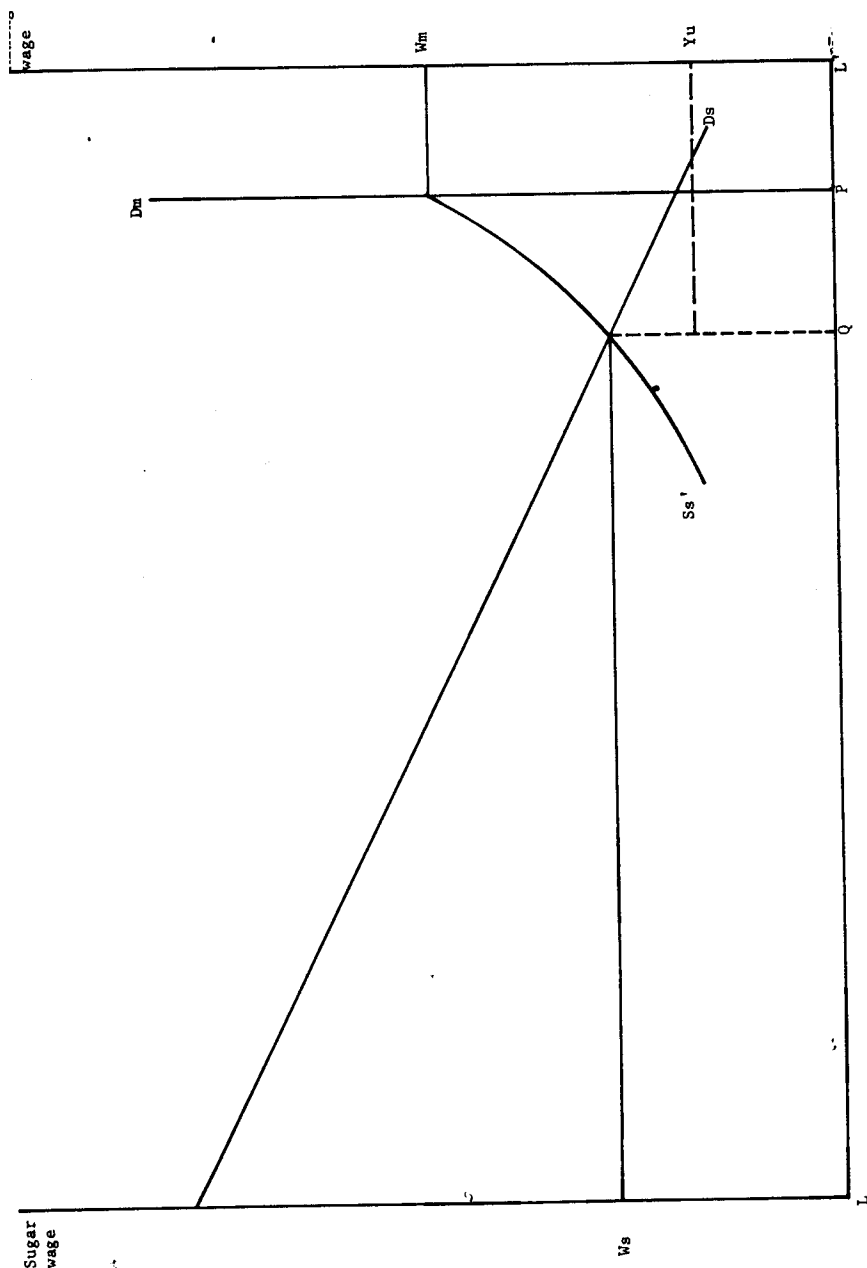


FIG. 3

employment. In any case, it is clear that an increase in mining wages or employment would increase the number of unemployed which the system could support, as well as raise expected lifetime earnings of those remaining temporarily unemployed.

Some sharing mechanisms may place a constraint on unemployment no matter how favorable the expected lifetime earnings differential. If the unemployed are supported largely by the low-wage sector, as in parts of Africa, increased wages or employment in the high-wage sector will not increase the capacity of the system to support unemployment as much as a high-wage-sector sharing mechanism. If the high-wage sector has a high propensity to share, however, support capacity will increase *pari passu* with the increased tendency of the system to generate unemployment. As suggested earlier, this is why Jamaica and Puerto Rico, with large high-wage sectors, can support more unemployment than Haiti.

The sharing mechanism helps determine not only how many but who will be unemployed. Where high-wage workers have a high propensity to share with dependents, for example, many of the unemployed will be new entrants whose reserve price is higher than the sugar wage because they live in a high-income household. This poses an interesting welfare issue. Since unemployment is voluntary with respect to low-wage employment, it appears that those who are worst off are not the unemployed but those forced to accept employment in the low-wage sector—the involuntarily employed as it were.

## VI. Empirical Evidence

A more elaborate wage-gap model would integrate the sharing mechanism to obtain separate response functions to wage and employment changes. It would also allow for many sectors and for skilled as well as unskilled labor. The present aim, however, is simply to develop a heuristic model. The main conclusion concerning the tendency toward wage spillover and a weak net employment effect is unchanged by allowing for complications. A third, intermediate-wage sector, for example, acts as a high-wage sector with respect to sugar and as a low-wage sector with respect to mining. The inclusion of skilled labor does not alter any of the main conclusions either.<sup>13</sup>

I have already shown that even the simple wage-gap model can explain many puzzling features of the Jamaican economy. I will try in this section to show that the model is consistent with other trends in the Jamaican economy and will cite some data which suggests that it may offer insights into the employment problems of a number of other less developed countries as well.

Unemployment can only exist if the unemployed have some means of support while they are seeking a high-wage job. The unemployed do not

<sup>13</sup> For elaboration, see Tidrick, "Wages and Unemployment in Jamaica."

have to be currently better off than those fully employed in the low-wage sector for unemployment to be economically rational, but the higher the incomes of the unemployed, the more plausible is the postulate of the wage-gap model that unemployment is voluntary with respect to the low-wage sector. The limited evidence from Jamaica on how the unemployed live suggests that many of the unemployed, though by no means all, may be better off than those fully employed in the low-wage sector.

In the first place, there are many casual job opportunities in Jamaica, some at very high wages. The most extreme example is the water transport industry (mostly dock workers). In the 1960 census survey week, less than half of the 5,522 workers (nearly 1 percent of the labor force) in this industry worked 5 or more days and more than one-fourth worked only 1-2 days. Dock workers could earn more in 2 7-hour days in 1965 than the typical agricultural worker earned in a full week. In this extreme case, many workers registered as unemployed in a given week may have been better off over the course of a year than other fully employed workers. Second, in spite of the much larger population of unemployed in the Kingston Metropolitan Area, average household working-class income in the KMA in 1963-64 was about twice that in rural areas, a difference not nearly offset by the cost-of-living differential. More strikingly, only 10 percent of KMA households earned less than the median rural household income.<sup>14</sup>

Finally, 92 percent of the unemployed were dependents in 1960. Or, put it in a different perspective, 98 percent of heads of households wanting work were employed. Of course, some might not have been heads of households because they were unemployed, rather than the other way around, but the presumption is that most were unemployed because they could not afford to be.<sup>15</sup>

A closely related bit of evidence bearing on the presumed voluntary nature of unemployment comes from interviews with unemployed Jamaican workers. Two such surveys largely confirm the expectation that the reserve supply price of the unemployed is higher than the ruling wage in the low-wage sector. An official study of the rural labor shortage by M. G. Smith in 1955 found that over 90 percent of those looking for work in areas of "good" labor supply and over 80 percent in "bad" areas would not accept regular employment at the going agricultural wage rate in their respective areas.<sup>16</sup> A survey by Robert Kerton of unemployed men in the Kingston area in 1966-67 found that one-third of those surveyed would not have accepted employment in the medium-wage, unskilled job of garbage col-

lection and about two-thirds had a reserve supply price higher than the average weekly earnings on large farms.<sup>17</sup> Of course, garbage collection is a low-status and unpleasant job, but probably no less so in Jamaica than agricultural work, which paid only half as much. Moreover, for some of these men, their choice of residence in an urban area is evidence of their voluntary unemployment as far as agricultural work is concerned.

Kerton also found that the reserve supply price of the unemployed fell with age.<sup>18</sup> Again, this is what the wage-gap model predicts. Young workers have a longer lifetime over which to offset low earnings in the initial period of unemployment and a lower discount rate for future earnings because of fewer family responsibilities. Thus, the reserve supply price tends to fall with age, the unemployed tend to be disproportionately young, and workers in the low-wage sector tend to be older than average. All three age-structural characteristics are borne out by Jamaican data.

Finally, the most important evidence supporting the hypothesis that most Jamaican unemployment is generated by the wage gap is the pattern of migration flows within Jamaica. An econometric study by Nassau Adams<sup>19</sup> found that distance and wage differentials among the 14 Jamaican parishes explained almost all the variance ( $R^2 = .860$  for Jamaican males age 15-54) of internal migration flows. Other variables—degree of urbanization, educational levels of sending areas, and unemployment levels—added negligibly to the explanation of migration flows. The unemployment level in receiving areas was positively (but insignificantly) correlated with migration rates, whereas the unemployment level in sending areas was positively (and significantly) associated with migration. The results confirm a central prediction of the wage-gap model. Migration occurs largely in response to wage differentials and in spite of higher unemployment levels in high-wage areas.

The size of the wage coefficient in receiving areas indicated that when wages in a high-wage area rose by 10 percent, the rate of migration rose by nearly 30 percent. Since Adams's study involved intercensal migration, this was cumulative migration over a number of years. Nevertheless, it implies a very powerful impetus to supply-withdrawal unemployment due to wage increases in the high-wage sector. Separate regressions for males age 15-29 and those age 30-54 showed a higher wage coefficient for the younger group, indicating both that the effect of wage differentials was more pronounced for younger workers and that the effect worked in a relatively short time period. Finally, it is noteworthy that the wage variable coefficient was three times as strong for receiving as for sending areas. Adams interprets this to mean "that people tend to over-react to a rosy picture displayed at a

<sup>14</sup> Jamaica, Department of Statistics, *Expenditure Patterns of Working Class Households* (Kingston: Department of Statistics, 1967), p. 10.

<sup>15</sup> Turnham (n. 4 above), p. 55, cites similar evidence from Puerto Rico where a study showed "that family income tended to be higher than average for the families to which unemployed workers belonged and that such families, on average, added more working members."

<sup>16</sup> M. G. Smith, 1955.

<sup>17</sup> Robert Kerton, "Labour Theory and Developing Countries: The Individual's Supply of Effort in the Caribbean" (Ph.D. diss., Duke University, 1968), pp. 58-59.

<sup>18</sup> *Ibid.*, p. 65.

<sup>19</sup> Nassau A. Adams, "Internal Migration in Jamaica: An Economic Analysis,"



distance.”<sup>20</sup> In terms of the wage-gap model, however, the results can be interpreted to mean that wage increases in low-wage areas were partly the result of migration in response to wage increases in high-wage areas. Induced wage increases would tend to slow the rate of migration but would not show as large an effect as autonomous wage increases caused by a shift in the demand curve for labor in low-wage areas.

The Adams study provides strong evidence in support of the wage-gap hypothesis. Similar results from studies in Brazil and Ghana<sup>21</sup> suggest that the wage gap may be an important determinant of urban unemployment in many other less developed countries as well.

None of the observed employment, wage, or migration patterns proves that the wage-gap model has identified the most crucial variables affecting employment. Many of the patterns can be explained in other ways or are consistent with other theories of unemployment. It hardly takes the concept of expected lifetime earnings differentials to predict that the unemployed will be disproportionately young, for example. Yet it is significant that the wage-gap model is consistent with so many of these patterns and that it can explain phenomena such as wage spillover and persisting high unemployment levels in the face of significant modern-sector employment growth and massive emigration abroad. Other theories of unemployment are either inconsistent with many of the features of the Jamaican and other less developed economies or must resort to a series of ad hoc explanations to encompass them.

## VII. Conclusion

The wage-gap model provides answers to the questions posed early in this paper and in the previous section.

Why does comparatively prosperous and rapidly growing Jamaica seemingly have more unemployment than poor and stagnant Haiti? Because the larger the high-wage modern sector, the more unemployed an economy can afford to support. In an economy without a high-wage sector, neither the incentive for nor the means to support unemployment may exist.

Why did employment growth in the high-wage sector and heavy migration abroad fail to reduce unemployment by a like amount? Because any reduction in the number of unemployed or any increase in the rate of hiring raises the probability of obtaining a high-wage job and induces further supply withdrawal from the low-wage sector.

Why did wages in unorganized, low-wage sectors rise along with wages in the unionized, high-wage sectors? Because the increased wage gap causes the supply curve of labor to the low-wage sector to shift.

<sup>20</sup> Ibid., p. 145.

<sup>21</sup> R. Beals, M. Levy, and L. Moses, “Rationality and Migration in Ghana,” *Review of Economics and Statistics* 49 (November 1967): 480–86; and Gian S. Sahota, “An Economic Analysis of Internal Migration in Brazil,” *Journal of Political Economy* 76 (March/April 1968): 218–44.

Why is there a long-standing labor shortage in agriculture when open unemployment levels have remained so high? Because the unemployed prefer unemployment and the uncertain prospect of a high-wage job to the certain prospect of low-wage steady employment.

Why do they prefer unemployment? Because their expected lifetime earnings are greater if they remain temporarily unemployed and because they have adequate means of support while searching for a high-wage job.

Why do migrants continue to pour into areas with high levels of unemployment? Because the higher wages the migrant will receive when he finally gets a job will more than compensate him for his forgone earnings in his place of origin.

Several additional conclusions and policy implications can be drawn from the wage-gap model, too.

First, there is increasing evidence that wage increases in the high-wage, modern sector reduce employment directly, but even if they did not, such wage increases tend to spill over and create unemployment elsewhere in the economy. Failure to recognize this spillover can be very costly.

Second, if unemployment is the result of a wage gap, the opportunity cost of labor to the high-wage sector is not zero. The only exception is the unlikely case in which the marginal product of labor in the low-wage sector is zero. If the high-wage sector is relatively small, its opportunity cost of labor will be greater than the marginal product of labor in the low-wage sector, since every job created in the high-wage sector will tend to wipe out more than one job in the low-wage sector. Shadow wage calculations based on the naive assumption that labor has no opportunity cost because of unemployment may reduce output as well as fail to increase employment. However, employment increases achieved by reducing the rate of wage growth in the high-wage sector (by moving along the demand curve for labor) will have a lower opportunity cost than increases achieved by shifting out the demand curve.

A third conclusion is that a devaluation or other general measure to reduce the wage level will not solve the short-run unemployment problem, even if high wages are a basic cause of unemployment and slow employment growth. The reason is that the devaluation leaves the wage structure intact.

It follows from this that wage policy guidelines should be tied explicitly to the wage or income gap. Guidelines allowing wage increases in proportion to overall productivity growth (or worse, individual industry productivity growth) do nothing to reduce the wage gap. Permissible wage increases should be inversely proportional to the gap between the wage level in the industry with excess supply and the wage or income level in the low-wage or low-income self-employed sector.

A fifth conclusion is that institutional changes, though sometimes difficult to effect, can be an important means of reducing unemployment. It may be possible to induce some industries to replace random hiring (at

the gate, for instance) with a queue system. With a queue system, that is, a system in which workers are told in what order they will be hired in future, workers will have a greater incentive to continue working in the low-wage sector until "called up." Casual labor hiring practices may also need modification. When casual employment is deliberately shared and rates set at a high enough level to provide a "decent income" for short work periods—as is frequently done on public works projects—the result may simply be greater supply-withdrawal unemployment.

Finally, it should be noted that, even if high wages cannot be lowered, the wage-gap model does not necessarily imply that rural development, subsidization of handicrafts, or other schemes to increase employment or incomes in the low-wage sector are preferable to industrialization or expansion of the high-wage sector. It is true that a job created in the low-wage sector will be a net new job for the economy as a whole while a new job in the high-wage sector will not. However, the relative cost of employment and income expansion in different sectors must also be considered. The employment effect of expansion of the modern industrial sector, even after allowing for spillover, may still be greater than use of the same resources in the low-wage sector.